



Supporting Sustainability Aspects in Software Engineering

CompSust'12, 6th of July 2012
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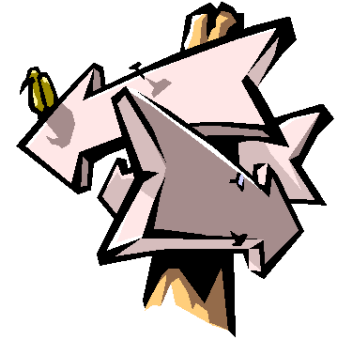
Tagbau der Gewerkschaft Humboldt
Braunkohlengrube u. Beihell-Fabrik, Wallensen.

Sustainability in SE – why?

- Problem: Scarce resources
- Current solutions:
 - Green IT
 - Efficient algorithms and operations
 - Green by IT

How to perform SE for Green IT and Green by IT?

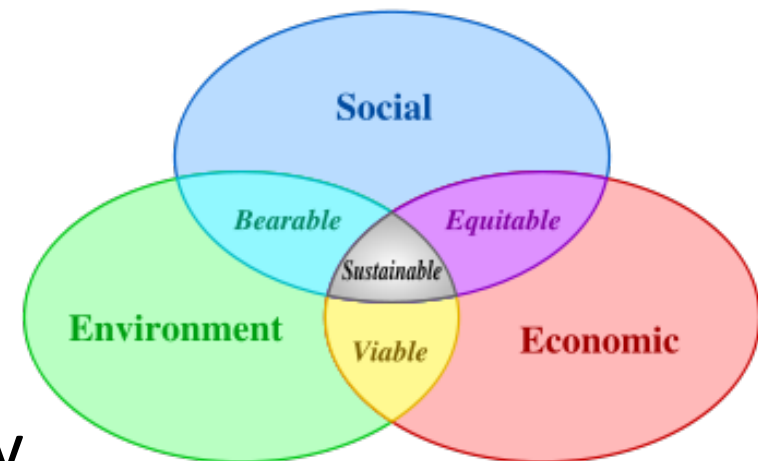
Overview



- What sustainability means in SE: Definition
- How to tackle it: A framework
- Where to go from here: Conclusions

Definition of Sustainability

- "The capacity to endure"
- Brundtland¹
"Sustainable development is development that
 - meets the needs of the present
 - without compromising the ability of future generations to meet their own needs."
- Goodland²
Human, Social,
Economic, Environmental
- Absolute def. of sustainability



1) United Nations Report „Our common future“, 1987

2) Encyclopedia of global environmental change, Wiley & Sons 2002

Sustainability in context of SE

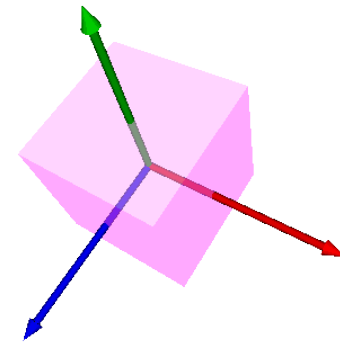
- Absolute definition + relative definition:
Scope (context) defined by

- System (S)
- Function (F)
- Time horizon (T)

- Absolute definition of sustainability

- S: Humanity in its ecosystem
- F: Satisfaction of needs
- T: Multiple generations

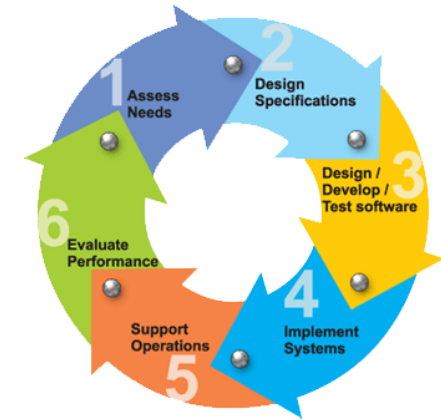
→ Relative definition?



Where is sustainability relevant in SE?

1. “System” = Software Company

1. Development Process Aspect
→ Hardware, QA, energy
2. Maintenance Process Aspect
→ Knowledge management

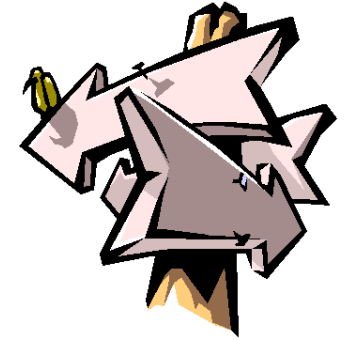


2. “System” = Software System

1. System Production Aspect
→ Assembly, components, logistics
2. System Usage Aspect
→ Effects in application domain

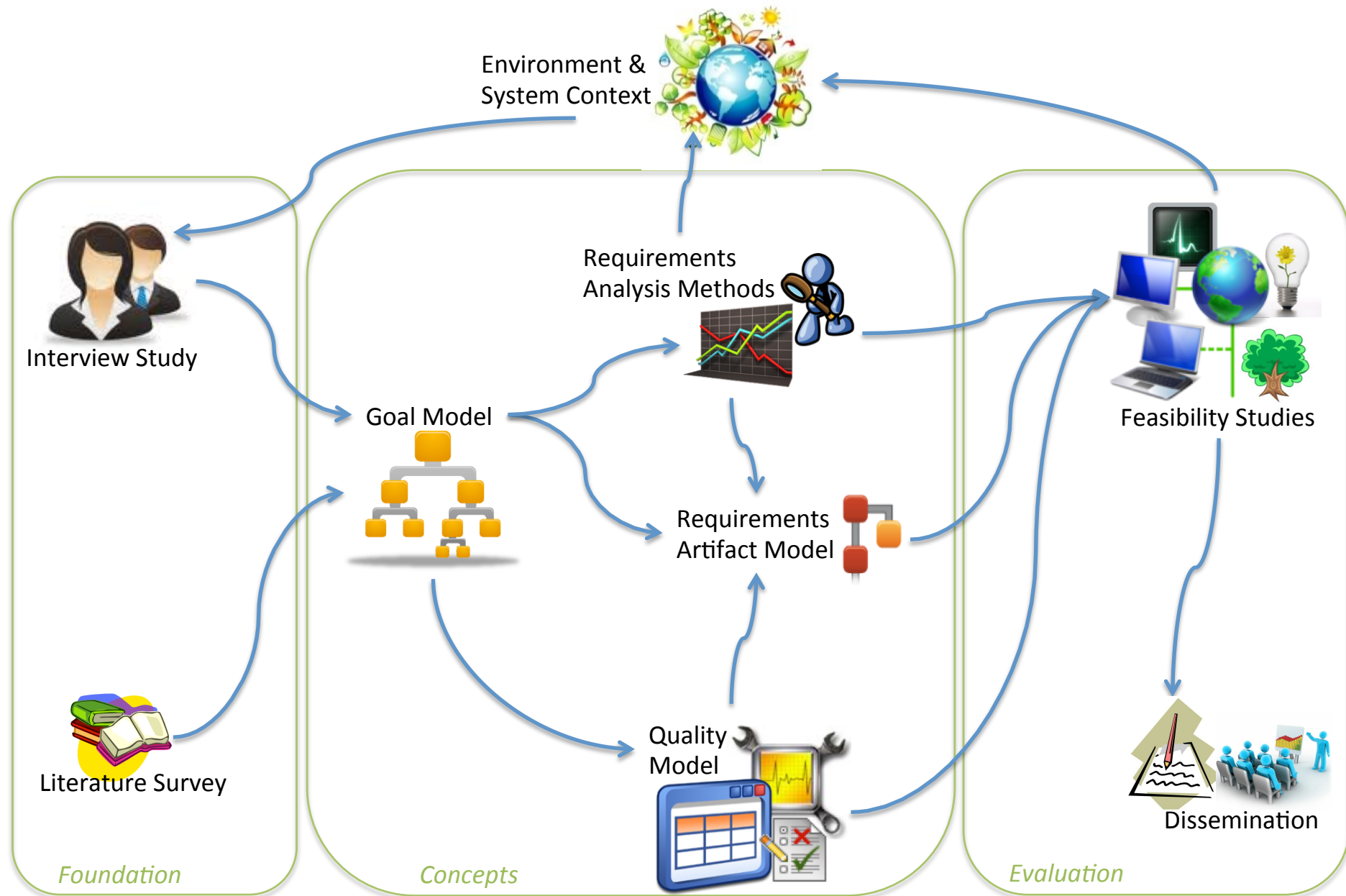


Overview

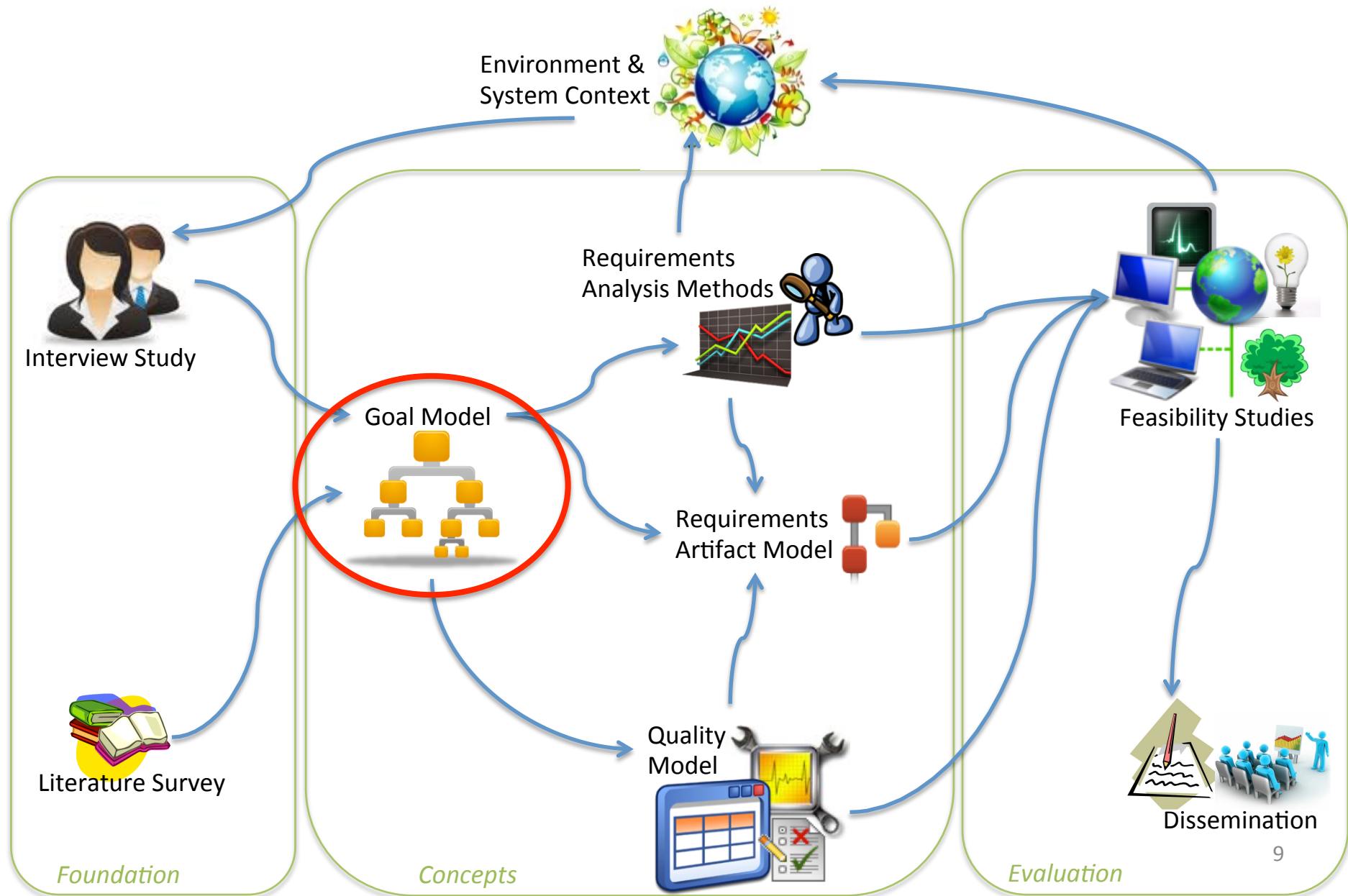


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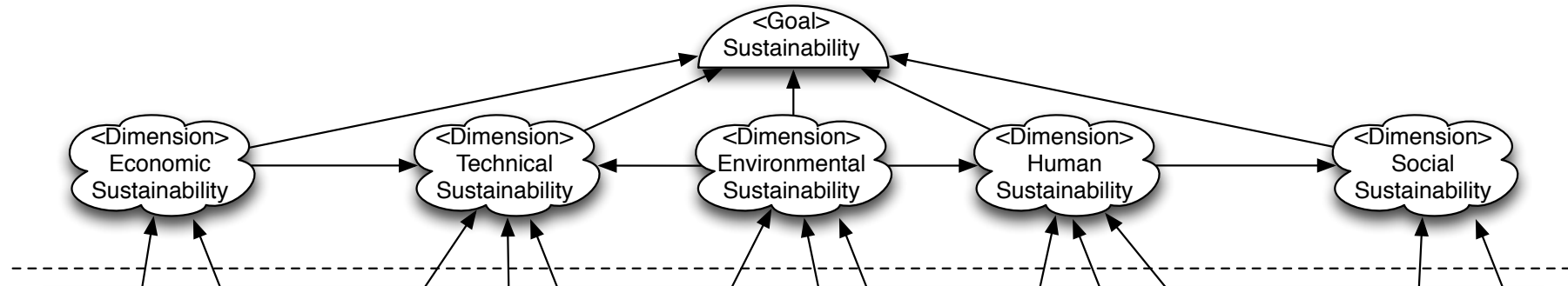
How to tackle it: A framework



Concept: Goal Model



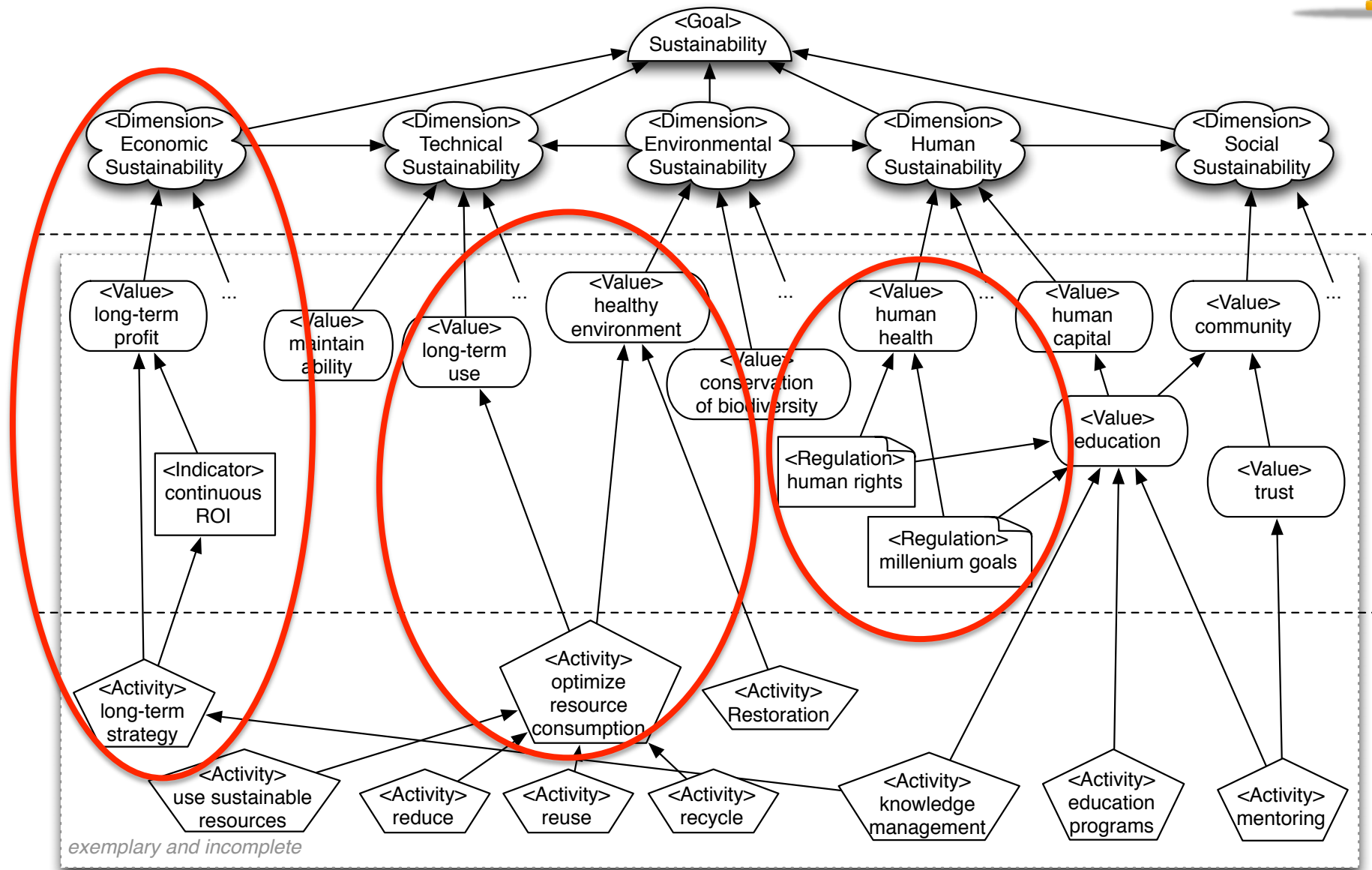
Generic Sustainability Model



Economic Sustainability	Technical Sustainability
Social Sustainability	
Human Sustainability	
Environmental Sustainability	

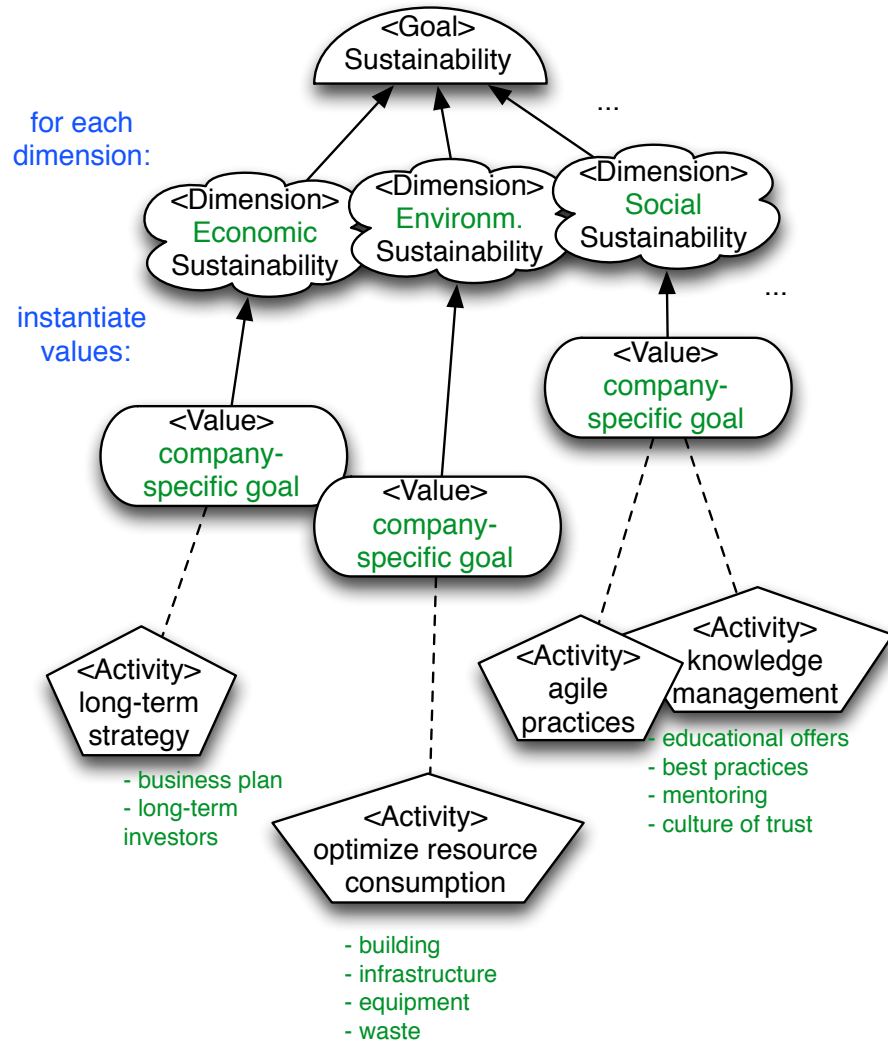
- 5 dimensions
- Decompose into values and supporting activities

Generic Sustainability Model



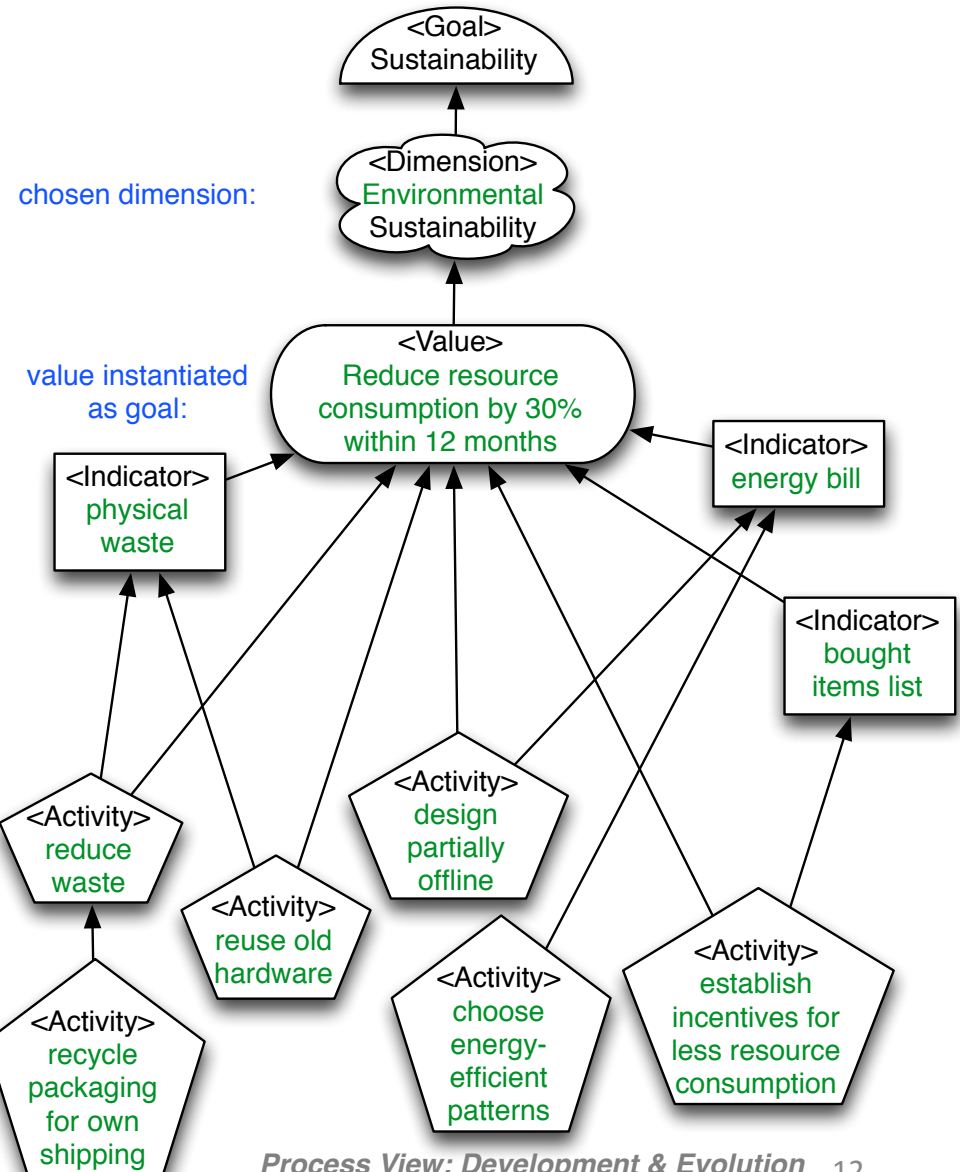
Instance

How to instantiate a Company-specific Sustainability Goal Model



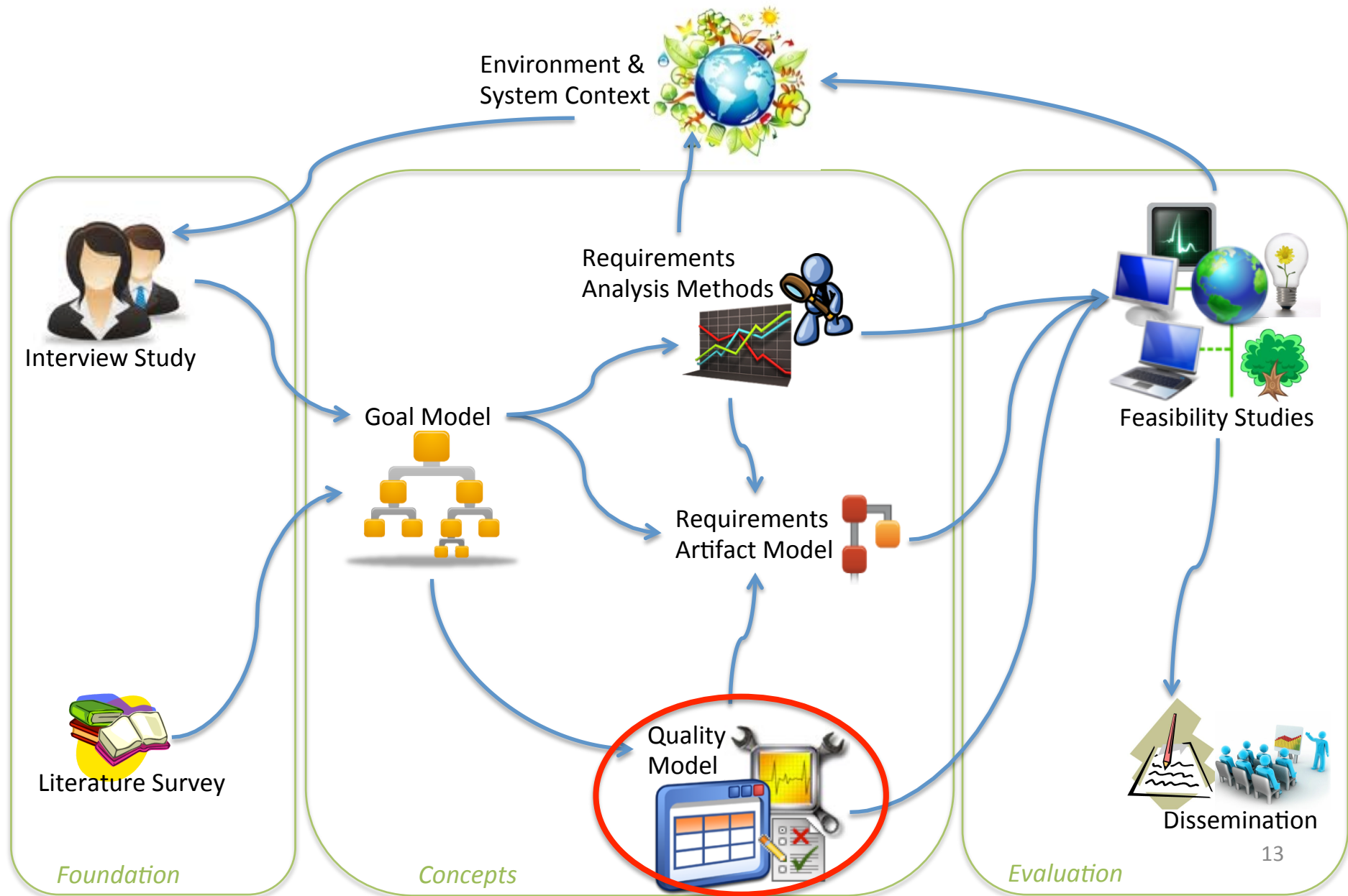
Process View: Development & Evolution

Example Instance of a Company-specific Sustainability Goal Model

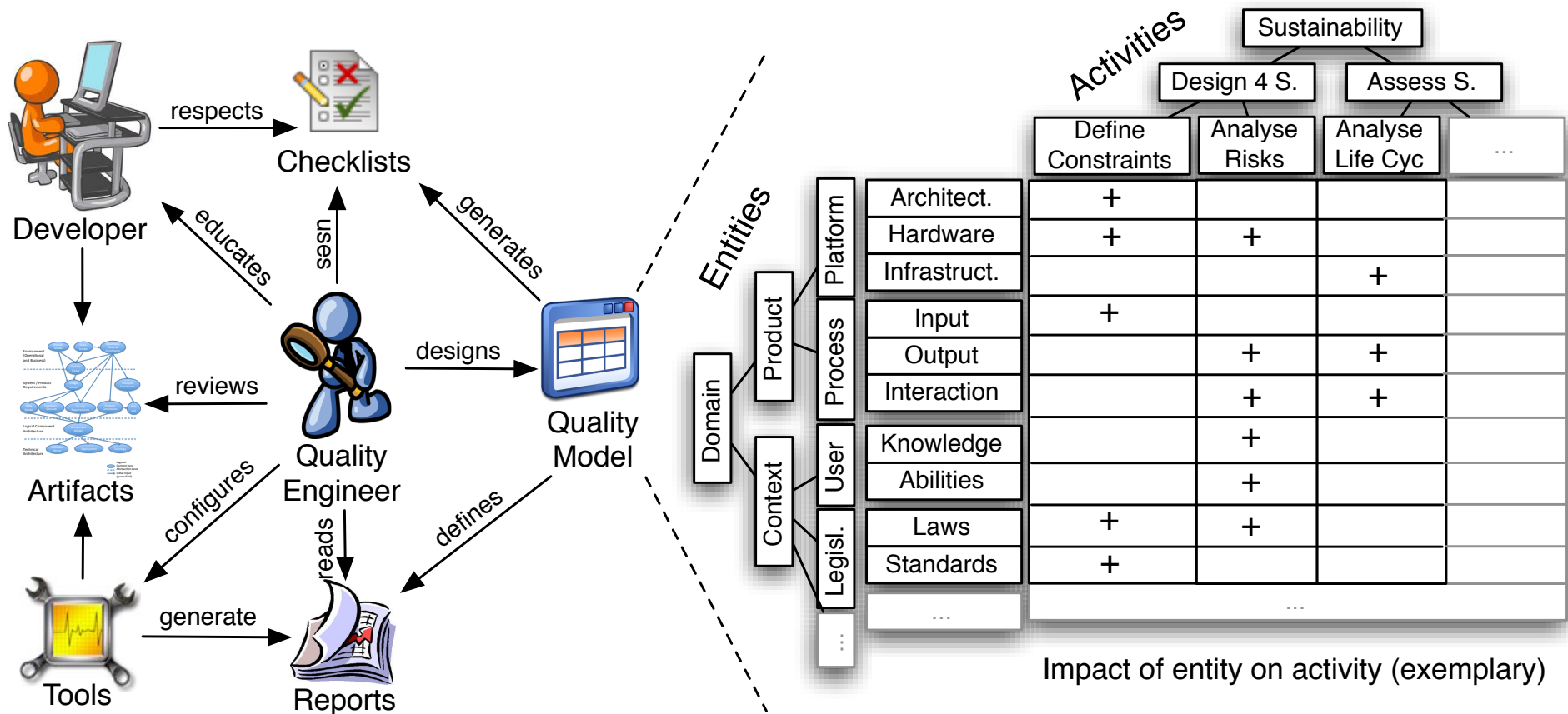


Process View: Development & Evolution 12

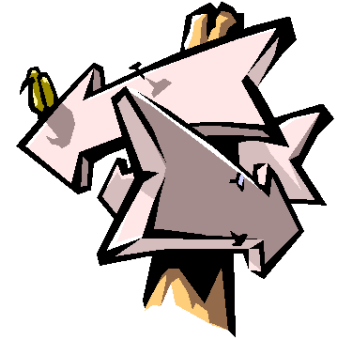
Concept: Quality Model



Activity-based Quality Model



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Conclusion

Summary

- Def. of Aspects of Sustainability in SE
- Supporting Framework
(especially Requirements Eng. and Quality Ass.)

Future

- Research collaborations
- Industry collaborations
- Integration into teaching



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